



(FEB)

PTO/SB/21 (09-06)  
Approved for use through 03/31/2007. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE  
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

Application Number	10/765,944
Filing Date	January 29, 2004
First Named Inventor	Klaus Gunter Engel
Art Unit	2832
Examiner Name	Bernard Rojas
Attorney Docket Number	8989-032/EC

### ENCLOSURES (Check all that apply)

<input type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> After Allowance Communication to TC
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Petition	<input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Power of Attorney, Revocation	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Change of Correspondence Address	<input checked="" type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> Express Abandonment Request	<input type="checkbox"/> Terminal Disclaimer	<input type="checkbox"/> Letter to USPTO submitting Certificate of Correction
<input type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> Request for Refund	<input type="checkbox"/> Certificate of Correction
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> Amendment filed on Feb. 6, 2006
<input type="checkbox"/> Reply to Missing Parts/ Incomplete Application	<input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> Notice of Allowance Sept. 12, 2006
<input type="checkbox"/> <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Remarks	

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Bereskin & Paten		
Signature			
Printed name	Isis E. Caulder		
Date	February 5, 2007	Reg. No.	47,275

### CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature		
Typed or printed name		Date

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

# Bereskin & Parr

INTELLECTUAL PROPERTY LAW



February 5, 2007

Isis E. Caulder  
B.A.Sc. (Eng. Sci.), M.A.Sc. (Elect. Eng.), J.D.  
416 957 1680    [icaulder@bereskinparr.com](mailto:icaulder@bereskinparr.com)

Your Reference: 10/765,944  
Our Reference: 8989-032

## REQUEST FOR CERTIFICATE OF CORRECTION UNDER 35 U.S.C. 254

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA  
22313-1450 U.S.A.

Dear Sir:

**Re: United States Patent No. 7,135,947  
United States Patent Application No. 10/765,944  
For: HYBRID MICROWAVE T-SWITCH ACTUATOR  
Filed: January 29, 2004  
Issued: November 14, 2006  
Applicant: Klaus Gunter Engel**

In accordance with the provisions of 37 C.F.R. 1.322(a)(1), the Office is requested to issue a Certificate of Correction. The applicant has attached a Certificate of Correction form PTO/SB/44. The Certificate requests the following corrections:

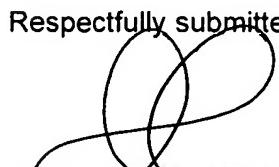
Claim 4, column 10, line 2, replace – having an if module -- with "having an rf module"

The above amendment corresponds to the attached 37 CFR 1.312 Notice of Allowance dated September 12, 2006 as acknowledged and entered by the Examiner and the Amendment filed on February 9, 2006.

As the error arose during the printing of the Patent by the Office, no fee is payable.

If you have any questions, please feel free to contact the undersigned at (416) 957-1680.

Respectfully submitted,

  
Isis E. Caulder – Reg'n No. 47,275  
Bereskin & Parr – Customer No. 001059

Encl.

/vh

Scotia Plaza, 40 King Street West, 40th Floor, Toronto, Ontario, Canada M5H 3Y2

Tel: 416.364.7311 Fax: 416.361.1398 [www.bereskinparr.com](http://www.bereskinparr.com)

TORONTO MISSISSAUGA WATERLOO MONTRÉAL

**UNITED STATES PATENT AND TRADEMARK OFFICE**  
**CERTIFICATE OF CORRECTION**

PATENT NO.: **7,135,947**

Page 1 of 1

APPLICATION NO.: **10/765,944**

ISSUE DATE: **November 14, 2006**

INVENTOR(S): **Klaus Gunter Engel**

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

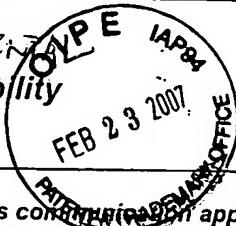
Claim 4, column 10, line 2, replace – having an if module – with "having an rf module"

**MAILING ADDRESS OF SENDER (Please do not use customer number below):**

Bereskin & Parr  
Box 401, 40 King Street West  
Toronto, Ontario, M5H 3Y2, Canada

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

SUPPLEMENTAL  
Notice of Allowability

Application No.	Applicant(s)
10/765,944	ENGEL, KLAUS GUNTER
Examiner	Art Unit
Bernard Rojas	2832

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTO-85) or other appropriate communication will be mailed in due course. THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS. This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to a phone conversation with Isis Caulder (Reg. No. 47,275) on 09/01/2006.

2.  The allowed claim(s) is/are 1 and 3-9.

3.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)  All b)  Some\* c)  None of the:

1.  Certified copies of the priority documents have been received.

2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

DDMFT. Dec. 12/06 VM

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4.  A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5.  CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

(a)  including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

1)  hereto or 2)  to Paper No./Mail Date \_\_\_\_\_.

(b)  including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

- |  |  |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                 | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),<br>Paper No./Mail Date _____. | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment                    |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material           | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance              |
|  | 9. <input type="checkbox"/> Other _____.   |

### **EXAMINER'S AMENDMENT**

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Isis Caulder (Reg. No. 47,275) on 09/01/2006.

The application has been amended as follows:

- Claim 5, Line 1 REPLACE "claim 2" WITH "claim 1"

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Rojas whose telephone number is (571) 272-1998. The examiner can normally be reached on M-F 8-4:00), every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin G. Enad can be reached on (571) 272-1990. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*Brent Ry*  
Br

*Eimy*  
REG'D.  
**SUPERVISORY PATENT EXAMINER**  
*O1 SEP0C*



Appl. No. : 10/765,944 Confirmation No.:  
Applicants : ENGEL, KLAUS GUNTER  
Filed : January 29, 2004  
Title : HYBRID MICROWAVE T-SWITCH ACTUATOR  
TC./A.U. : 2832  
Examiner : Bernard Rojas  
  
Docket No. : 8989-032  
Customer No. : 001059

Honorable Commissioner for Patents  
P. O. Box 1450  
Alexandria, Virginia 22313-1450

**AMENDMENT**

Sir:

This response is filed within three months after the expiry of the shortened statutory period for response, which expired on November 9, 2005. A request for a three-month extension of time is being filed concurrently herewith under separate cover and accordingly it is submitted that this Response is timely filed. Please amend the above-identified application as follows:

**Amendments to the Claims** are reflected in the listing of claims, which begins on page 2 of this paper.

**Remarks/Arguments** begin on page 5 of this paper.

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently amended): A hybrid switch actuator having six positions that are stable in the absence of current and in which displacement occurs between an initial position and a target position under the action of a current, for operation of a microwave switch, said actuator comprising:

- (a) a stator having six pole shoes, each pair of opposed pole shoes being associated with a common exciting coil;
- (b) a rotor package rotatable along a rotation axis and adapted to be positioned within said stator and having two pairs of rotor poles magnetized transversely in alternate directions, said rotor package including:
  - (i) a permanent magnet ring magnetized along the rotation axis;
  - (ii) two end caps adapted to be engaged around said permanent magnet ring, each end cap having two maximum radius regions that each correspond to the area of each of the stator pole shoes, each end cap also having four reduced radius regions, each maximum radius region having two of said four reduced radius regions positioned adjacent therein;
- (c) wherein the difference between the radius of the maximum radius regions and the radius of the reduced radius regions is substantially smaller than the radial dimensions of the rotor package;
- (d) such that when the actuator is in the initial position two diametrically opposed stator pole shoes having a first polarity are excited through their associated common exciting coil, said stator pole shoes attract two diametrically opposed rotor poles having an opposite polarity to said first polarity and repel the

remaining two rotor poles, and the remaining two rotor poles are repelled from the stator pole shoes having a first polarity, and as the minimum radius regions adjacent to the maximum radius regions of the diametrically opposed rotor poles overlap the stator pole shoes having a first polarity, a reduction of the reluctance gap therebetween occurs and then as the maximum radius regions of the diametrically opposed rotor poles overlap the stator pole shoes having a first polarity a further reduction of the reluctance gap therebetween occurs until such that each rotor pole associated with a maximum radius region is can be precisely aligned with a stator pole associated with a stator pole shoe of the actuator in the target position.

2. (Cancelled).

3. (Original): The actuator of claim 1, wherein said end caps are separated from each other by at least 1.5 mm.

4. (Original): The actuator of claim 1, wherein rotor package is adapted to move from any initial position to any target position by moving 60 degrees.

5. (Original): The actuator of claim 1 in combination with a T-switch having an rf module, wherein said maximum radius regions and said minimum radius regions are dimensioned to match the torque of the actuator to the T switch so that in the presence of current, high torque is achieved when the resisting load from the rf module is greatest.

6. (New): The actuator of claim 1, wherein the difference between the radius of the maximum radius region and the radius of the reduced radius region is in the range of .5% to 2.2% of the radius of the permanent magnet.

7. (New): The actuator of claim 1, wherein the difference between the radius of the maximum radius region and the radius of the reduced radius region is in the range of .416% to 2.5% of the thickness of the permanent magnet.
8. (New): The actuator of claim 1, wherein each pair of opposed stator pole shoes are of like polarity.
9. (New): The actuator of claim 1, wherein each pair of opposed rotor poles are of like polarity.

**REMARKS/ARGUMENT**

This letter is responsive to the Office Action mailed on August 9, 2005. The claims have been amended in response to the outstanding Office Action and new claims 6 to 9 have been added. No new matter has been added by the amendments.

Claims 1 to 9, as amended, are currently pending in the application.

**Rejection under 35 U.S.C. 112 second paragraph**

The Examiner has rejected claims 2 and 5 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner states that the term "end" in claim 2 is unclear and that it will be interpreted as being "end cap". Claim 2 has been cancelled by the present amendments.

The Examiner also states that claim 5 is incomplete since it omits essential structural cooperative relationships of elements amounting to a gap between the necessary structural connections. Specifically, the Examiner states that a structural cooperative relationship must be provided between the maximum radius regions and the minimum radius regions being dimensioned to match the torque of the actuator and the microwave T-switch. In response, the Applicant has amended claim 5 to cover the actuator in combination with a T-switch having an rf module, wherein said maximum radius regions and said minimum radius regions are dimensioned so that in the presence of current, high torque is achieved when the resisting load from the rf module is greatest. Support for these amendments are provided in the disclosure at page 12, lines 18 to 29.

Accordingly, the Applicants respectfully submit that the claims, as amended now comply with the second paragraph of 35 U.S.C. 112.

**Claims 1 to 5 rejected under 35 U.S.C. §103(a) in view of Walker et al. and Honsinger et al.**

The Examiner has rejected claims 1 to 5 under 35 U.S.C. §103(a) as being obvious in view of Walker et al. (U.S. Patent No. 3,959,672) and Honsinger et al. (U.S. Patent No. 4,388,545).

Specifically, the Examiner states that the Walker et al. reference discloses a hybrid switch actuator that includes a stator having six pole shoes (12 in FIG. 1 of Walker et al.) where each pair of opposed pole shoes are associated with a common exciting coil (col. 1, lines 40-51, FIG. 1 of Walker et al.) and where when two diametrically opposed stator pole shoes having a first polarity are excited through their associated common exciting coil, the stator pole shoes attracting two diametrically opposed rotor poles having an opposite polarity to the first polarity and repel the remaining two rotor poles such that each rotor pole associated with a maximum radius region can be precisely aligned with a stator pole associated with a stator pole shoe (col., 1, lines 40-51 of Walker et al.).

Also, the Examiner states that Honsinger et al. reference discloses a rotor package rotatable along a rotation axis and adapted to be positioned within the stator, having two pairs of rotor poles magnetized transversely in alternate directions, and including a permanent magnet ring (3 in FIG. of Honsinger et al.) magnetized along the rotation axis and two end caps (11, 13 in only FIG. of Honsinger et al.) adapted to be engaged around said permanent magnet ring, each end cap having two maximum radius regions that each correspond to the area of each of the stator pole shoes (FIG. 1, col. 2, lines 27-28 of Honsinger et al.).

In response, the Applicant has amended claims 1 to 5 to better define the claimed subject matter and to clarify the distinction between this claimed subject matter and the cited prior art references.

Specifically, claim 1 has been amended to specify that each end cap of the hybrid switch actuator also has four reduced radius regions, two of each reduced radius regions being positioned adjacent to each maximum radius region and wherein the difference between the radius of the maximum radius regions and the radius of the reduced radius regions is substantially smaller than the radial dimensions of the rotor package such that when the minimum radius regions adjacent to the maximum radius regions of the diametrically opposed rotor poles overlap the stator pole shoes having a first polarity, a reduction of the reluctance gap therebetween occurs. Support for these amendments are provided in the disclosure at page 5, line 28 to page 6 line 1, page 8 lines 4 to 30, page 9, lines 1 to 9, page 9, line 10 to page 11, line 22 and FIGS. 3A, 3B, 3C, 4A, 4B, and 4C.

The Applicants respectfully submit that claims 1 to 5, as amended, are not obvious in view of Walker et al. and Honsinger et al.

It is an established principle that when considering whether a particular reference is citable prior art, it is not the difference and similarity between the two arts generally that matters, but rather, it is the difference and similarity in terms of the particular problems to be solved (*Automatic Arc Welding Co. v. A.O. Smith Corp.*, (1932) 60 F. 2d 740, 14 U.S.P.Q. 127 (7<sup>th</sup> Cir. 1932)). The Applicant respectively submits that the Walker et al. and Honsinger et al. references discloses devices that are directed to a substantially different problem than the presently claimed invention.

The Walker et al. reference discloses a variable switched reluctance electric motor that uses a stator including at least three pairs of pole pieces with windings surrounding at least one of the pole pieces of each pair and a rotor structure. The Walker et al. motor is

a single excited device with a driven coil on the stationary part and soft ferromagnetic material on the moving part. Force is developed as the moving part tends towards an orientation in which the magnetic reluctance is minimum and there is zero un-powered torque. These kinds of actuators only operate efficiently where small angular (i.e. less than 60 degrees) displacements are required and as is conventionally known, a variable reluctance actuator does not have stable positions in the absence of current (Invention Disclosure, page 2, line 5 to 14).

The Honsinger et al. reference discloses a rotor package for a permanent magnet AC motor. The rotor package includes a permanent magnet disk mounted on a shaft and two starting disks of current carrying material mounted on either side of the magnet to act as starting coils. Pole pieces are mounted on either side of the starting disks and have claw-like projections spaced about and extending from the periphery of the pole pieces. These claw-like projections extend inwardly over the magnet and starting disks. The claw-like projections from each pole piece are interlaced forming rotor poles of alternating polarity. The permanent magnet motor which is a doubly excited device in which magnetic flux is generated by a driven coil on the stationary part and a permanent magnet on the moving part and force is developed through the mutual flux linkages. Typically, permanent magnetic devices exhibit residual torque properties that tend to hold the actuator in preferred locations when unpowered and these effects (due to the influences of the magnets) must be overcome when applying power to achieve a new position diminishing the ultimate performance of the actuator (Invention Disclosure, page 1, line 19 to page 2, line 4).

In contrast, the presently claimed invention is directed to a hybrid switch actuator which operates in the presence of current and which also maintains a stable position in the absence of current. The presently claimed invention is a true hybrid switch actuator that exhibits properties of both permanent magnet motors (i.e. permanent poles) and variable reluctance motors by varying magnetic reluctance across the air gap achieved by optimization of the pole geometry.

Accordingly, since the Walker et al. reference is concerned primarily with improving the operation of a variable switched reluctance machine and since the Honsinger et al. reference is directed at a claw-pole structure for a permanent magnet motor device that realizes alternating poles using a single magnet, it is submitted that there is a substantial difference in the particular problems to be solved and the underlying technical fields and that the Walker et al. and Honsinger references should not be considered analogous art in this case.

Even if the Examiner still considers the Walker et al. and Honsinger et al. references to be applicable prior art in the present case, the Applicant submits that providing the end caps of the hybrid switch actuator with four reduced radius regions, such that the difference between the radius of the maximum radius region and the radius of the reduced radius regions is substantially smaller than the radial dimensions of the rotor package such that when the minimum radius regions overlap the stator pole shoes, a reduction of the reluctance gap therebetween occurs is not obvious in view of the Walker et al. and Honsinger et al. references.

The rotor structure of Walker et al. contains circumferential extensions 15 and 16 which extend on opposite sides of diametrically disposed pole pieces 14 and which are shown to be of the same radial length (Walker et al., FIGS. 2 and 3). There is nothing disclosed in Walker et al. to either show or suggest the reduction of the reluctance gap between the stator and the rotor through the use of reduced radius regions as claimed in the present invention. Rather, as is common in the art, the rotor structure of Walker et al. provides large pole-isolating gaps in between the rotor poles.

Also, Honsinger et al. discloses a rotor package having pole pieces 11 and 13 with extending interlaced claw-like projections. Also, there are intermediate regions on the pole pieces 11 and 13 that are run in between the claw-like projections and have a lesser radius (Honsinger et al. FIG. 1). There is nothing disclosed in Honsinger et al. to either show or suggest the reduction of the reluctance gap between the stator and the

rotor through the use of reduced radius regions as claimed in the present invention. Accordingly, the difference between the radius of these regions on the pole pieces 11 and 13 and the radius of the pole pieces 11 and 13 at the site of the interlaced claw-like projections appears to have simply and conventionally been intended to ensure that the poles are properly magnetically isolated. In fact, it is generally well known in the art that rotor/stator poles are associated with surfaces that present very small air gaps and any interface that does not present a small air gap is considered non-operative (i.e. magnetically isolating).

Accordingly, the Applicants submit that it would not be obvious to one of ordinary skill in the art in view of Walker et al. and Honsinger et al. to provide each of the end caps of the hybrid switch actuator with four reduced radius regions, such that the difference between the radii of the maximum radius regions and the reduced radius regions is substantially smaller than the radial dimensions of the rotor package such that when the minimum radius regions overlap the stator pole shoes, a reduction of the reluctance gap therebetween occurs.

Finally, the Examiner states that it would have been obvious to one of ordinary skill in the art at the time that the invention was made to use the easily manufactured rotor of Honsinger et al. in the stator of Walker et al. in order to reduce the cost of the rotor. The Applicant submits that the principles taught by the Walker et al. and Honsinger et al. references are so different that one of skill in the art would not be motivated to combine them to gain the desired result claims in the present claims, as amended.

As discussed above, the Walker et al. reference is concerned primarily with improving the operation of a variable switched reluctance machine. Also, the Honsinger et al. reference is directed at a claw-pole structure for a permanent magnet motor device that realizes alternating poles using a single magnet. Due to formidable differences in magnetic behaviour and design of a permanent magnetic motor device and a variable

switched reluctance machine, it would not be possible to produce a working motor by combining the rotor of Honsinger et al. with the stator of Walker et al.

As an illustration of this fundamental incompatibility, the rotor of Honsinger et al. is a six pole rotor and the stator of Walker et al. is a six pole stator. Permanent magnet DC motors typically have different numbers of stator and rotor poles or non-uniform spacing between either the rotor or stator poles. The result of placing the Honsinger et al. rotor within the Walker et al. stator would be that all six of the permanently magnetized rotor poles will align to the six stator poles. Since the Walker et al. stator provides an efficient magnetic return path for the permanent magnet flux, it is unlikely that the induced magnetism from the stator coils would produce enough torque to dislodge the rotor.

Also, it should be noted that the stator in Walker et al. is comprised of pole pieces provided with windings that are connected so that when supplied with uni-directional current, the pole pieces of the pair will be of opposite magnetic polarity (Walker et al., Col. 1, lines 47 to 51). In the rotor of Honsinger et al. the interlaced claw-like projections extending from the pole pieces form alternating north and south poles with the polarity of the projections determined by its associated pole piece (Honsinger et al. Col. 2, lines 51 to 54). Due to the physical structure of the rotor of Honsinger et al. diametrically opposite rotor poles will be of opposite magnetic polarity.

In contrast, the operational principle of the hybrid switch actuator as presently claimed requires that each pair of opposed pole shoes and each pair of opposite rotor poles are of similar magnetic polarity. Accordingly, it is submitted that even if the rotor of Honsinger et al. could be said to work within the stator of Walker et al., the fundamental operation of such a device would not correspond to that of the claimed hybrid switch actuator.

Accordingly, the Applicant submits that there would not be any reasonable motivation for someone skilled in the art to utilize the rotor of Honsinger et al. within the stator of Walker et al. to build the hybrid switch actuator of the present invention.

Accordingly, the Applicant respectfully submits that the subject matter claimed in independent claim 1, as amended, is not obvious in view of the Walker et al. and Honsinger et al. references. It is further submitted that claims 3 to 5, as amended, recite additional patentable features that are neither taught nor suggested by the Walker et al. or Honsinger et al. references. Withdrawal of the Examiner's rejection in respect of claims 1 to 5 is respectfully requested.

### **New Claims 6 to 9**

The Applicant has introduced new claims 6 to 9 that relate to additional particulars concerning the difference in radius of the maximum radius regions and the minimum radius regions and the polarity of opposed stator pole shoes and rotor poles. Support for these new claims are provided in the disclosure at page 5 line 28 to page 6, line 1, page 8 lines 14 to 17, and FIGS. 3A, 3B, 3C, 4A, 4B and 4C.

Specifically, the percentage values provided in claims 6 to 7 are obtained in reference to the ranges provided in the disclosure at page 5 line 28 to page 6, line 1, page 8 lines 14 to 17, namely "the magnitude of the radius difference between the maximum radius region and the reduced radius region is typically 0.05 mm to 0.10 mm", "permanent magnet is preferably manufactured to have a thickness .... in the range of 4 to 12 mm", and "permanent magnet preferably has a diameter in the range of 12 to 15 mm".

**References Made of Record and Not Relied Upon**

The Applicant has briefly reviewed the other references cited by the Examiner. The Applicant respectfully submits that these references do not recognize the problem solved by the present invention and do not describe or even suggest the present invention. The Applicant respectfully submits that they are not relevant to the patentability of the claims of the present invention.

In view of the foregoing, the Applicant respectfully submits that the application is now in condition for allowance. If the Examiner believes that a telephone interview would expedite allowance of the application, the Examiner is respectfully requested to contact the undersigned at (416) 957-1680.

Respectfully submitted,

**ENGEL, KLAUS GUNTER**



Isis E. Caulder, Reg. No. 47,275  
Bereskin & Parr, Customer No. 001059  
Tel: (416) 957-1680